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EXTRACT FROM THE PRESIDENT'S ADDRESS.

BY EDGAR F. SMITH.

(Read December 18, 1903.)

Amid the activities of the year, while we all have been busy in our several vocations, word has been passed from time to time that the grim Messenger had appeared in our circle and summoned to the silent majority not a few of our fellow-members. This roll included—

DR. CHARLES SCHAFER, who was born in this city sixty-six years ago. He graduated from the Medical Department of the University of Pennsylvania at the age of twenty-one. His poor health prevented him from devoting himself wholly to his chosen profession. He was deeply interested in the natural sciences and their applications. He took an active part in the affairs of the Academy of Natural Sciences, the Historical Society of Pennsylvania, the Franklin Institute, the Photographic Society of Philadelphia, the American Association of Mining Engineers, and was particularly well known in the scientific world for his work in the field of botany. His knowledge of the local species of plants and shrubs was profound. He made a special study of the mountain flora of British Columbia. He died November 23, 1903.

DR. THOMAS G. MORTON was born in this city on August 8, 1835. After preparation in the city schools and the College of the University of Pennsylvania he entered the Medical Department, from which he graduated in 1856.

He devoted himself chiefly to general surgery and was a resident physician in the Pennsylvania Hospital for some time. He was one of the founders of the Polyclinic Hospital and the Orthopedic Hospital. His many services to the State on various boards and commissions included the erection of the State Hospital for the Insane for the Southern District of Pennsylvania.

In 1880 he was chosen President of the Pennsylvania Society for the Restriction of Vivisection and Vice-President of the Society to Protect Children from Cruelty. Dr. Morton had great success as a surgeon. His clinical lectures at the Pennsylvania Hospital were attended by thousands of students from all parts of the world. He was a member of various foreign and American professional bodies,

and a frequent contributor to journals of medicine. His own books are *The Transfusion of Blood* and *The Surgery of the Pennsylvania Hospital*, together with a history of the latter institution. He was actively engaged in public school work in this city, and for many years was a member of the Board's most important committees. He was a member of the Academy of Natural Sciences and of the Union League. He died May 20, 1903, at Cape May.

REV. HENRY CLAY TRUMBULL was born in Connecticut, June 8, 1830. He received his education in Williston Seminary.

In 1858 he became a missionary for the State Sunday School Association, which had its headquarters in Hartford. He was a chaplain in the Tenth Regiment in the Civil War. In 1863 he was taken prisoner before Fort Wagner and sent to the Charleston jail, later to Libbey Prison, where he was held for several months.

Five of his books treat of his army experiences. They were *Some Army Soldiers*, *The Knightly Soldier*, *A Biography of Major Henry Ward Camp*, *The Captured Scout of the Army of the James* and *War Memoirs of an Army Chaplain*.

At the end of the war he returned to Sunday School work. In 1866 he received the degree of M.A. from Yale, and in 1881 the degree of D.D. from Lafayette College, and the same degree from the University of New York in 1882. In 1875 he took charge of the *Sunday School Times* of this city, and during his editorial career wrote a number of books of a devotional character. He traveled in Egypt, Arabia and Syria, where he studied the track of the Exodus and identified the site of Kadash-Barnia. Following this sojourn abroad he prepared a number of volumes, some of which bear these titles, *The Ten Commandments as a Covenant of Love*, *Light on the Story of Jonah*, *Subjects in Oriental Social Life*, *The Threshold Covenant*, *The Covenant of Saul*, etc., etc. He died in this city on December 8th.

PROF. ROBERT H. THURSTON was born in Providence, R. I. In 1859 he graduated from Brown University with the degree of Civil Engineer. He served throughout the Civil War, beginning in 1861, being finally promoted to the position of chief engineer of one of the monitors. For six years he was an instructor in the United States Naval Academy at Annapolis. In 1871 he became Professor of Mechanical Engineering in the Stevens Institute of Technology.

This position he held until 1885, when he was called to the directorship of the Sibley College of Mechanic Arts at Cornell University. His work in both of these institutions of learning was most successful. It was characterized by great energy and executive ability. In 1873 Dr. Thurston was United States Commissioner to the Vienna Exposition. In 1875 he was appointed a member of the United States Board to Test Metals. In connection with this work he devised a machine for torsional tests, and made numerous investigations in the Mechanics of Materials.

In 1883 he published a work in three volumes, bearing the title *The Materials of Engineering*. Other books by him, such as the *Handbook of Engines and Boiler Trials*, *Stationary Steam Engines and Boiler Explosions*, have had a wide circulation. His *Manual of the Steam Engine*, in three volumes, was translated into French. Some of his other publications are *Friction and Lubrication*, *Friction and Lost Work*, *The Animal as a Machine and Prime Motor*, and *The Life of Robert Fulton*.

His contributions to scientific and engineering periodicals ran up into the hundreds.

He was a member of many scientific societies at home and abroad. He was one of the founders of the American Society of Mechanical Engineers, and its first President. He was a Vice-President of the American Association for the Advancement of Science in 1877, 1878 and in 1884.

The scientific and engineering work of Professor Thurston was of great benefit to mankind, for he made engineers better scientists, promoted engineering education, helped to put engineering upon a higher plane, and was constantly watching to dispel the fogs of prejudice by help of the truths of science.

He was the recipient of the honorary degree of LL.D. from his alma mater, and of the degree of Doctor of Engineering from Stevens Institute.

"In all his relations to general University problems he exhibited the spirit of the scholar and the wisdom of the man of affairs. Serene in temper, sound in judgment, swift and certain in action, he justly exercised a weighty influence.

"As a colleague he exhibited an interest in all good learning and bespoke a good scholar and a general fellow-worker. As a friend and companion, he manifested a cordial sympathy that attracted all who knew him and held them in the bonds of an increasing affec-

tion. In all the relations of life he moved upon the highest levels and showed forth the better qualities of our nature."

His loss falls heavily upon all—his colleagues, his friends and his University—but most heavily upon his family, with whom we deeply sympathize.

WILLIAM VINCENT McKEAN was born in Philadelphia, October 15, 1820, and died March 23, 1903. He was associate editor of the *Pennsylvania* with John W. Forney in 1852; chief clerk of the House of Representatives from 1853 to 1855; examiner of the United States Patent Office; private secretary to James Buchanan; an editorial writer for the *Philadelphia Inquirer* and *Public Ledger*. He edited the *National Almanac Record* for 1864, and wrote a report favoring the money order system for the United States in 1858, *What the Navy Has Done During the War* in 1864, *General McClellan's Campaign* in 1864, and delivered an address in Independence Hall on July 2, 1876, entitled "The Centennial of American Independence."

THEODORE D. RAND was born in Philadelphia, September 16, 1836, and graduated from the Episcopal Academy and the Polytechnic College. In 1858 he was admitted to the Bar and practiced Law for a time. He was chiefly known for his scientific work in connection with Mineralogy and Geology, having published a number of papers on these branches and lectured very frequently before scientific bodies. He was a member of the Mineralogical section of the Academy of Natural Sciences, also the Franklin Institute and the American Institute of Mining Engineers. He died on April 24, aged sixty-seven years.

EDWARD RHOADS. It was only last spring that this young scientist was received into our membership. No one at that time dreamed that he would not be with us now in the full vigor of manhood. His history is briefly as follows:

Dr. Rhoads graduated with honors from Haverford College in 1893. He studied from 1896-1898 at Johns Hopkins University, from which institution he received the degree of Doctor of Philosophy. Immediately thereafter he became instructor in physics in the Worcester Polytechnic Institute. Leaving here in 1901 he was

appointed to a similar position in Haverford College. Among his publications we find the following titles:

"The Effect of the Fibrous Structure of Sheet Iron on the Changes in Length Accompanying Magnetizations."

"Experiments on the Change in Dimensions Caused by Magnetization in Iron."

"Relations Between the Changes in Thermo-Electric Power Caused in Magnetization."

Dr. Rhoads was unmarried and resided with his mother in Germantown. He was a member of the American Association for the Advancement of Science.

CHARLES GODFREY LELAND was born in Philadelphia in 1824, and received his education at Princeton and the Universities of Heidelberg, Munich and Paris. He was very active in the Revolution of 1848 and was one of the American delegates to congratulate the Provisional Government.

He studied and practiced Law in Philadelphia for four years, beginning with 1849, and then devoted himself to Journalism and the writing of books. In 1869 he removed to Europe, living chiefly in London, and was occupied with literature. On his return to America in 1880 he devoted much time in introducing the minor arts as a branch of instruction in public schools. Since 1886 he has been residing in Florence. He has been a frequent contributor to the Oriental, Social Science and Folklore Societies.

He published *Poetry and Mystery of Dreams* in 1850, *Hans Breitman's Ballads* in 1858, *English Gypsies* in 1852, *English Gypsy Ballads* in 1873, *Life of Abraham Lincoln* in 1881, *The Minor Arts* in 1881, *Gypsy Sorcery* in 1891, *Etruscan Roman Forms* in 1892, and numerous other books. His specialty seems to have been the study of tradition and folklore. He passed away on March 20, 1903, in Florence, Italy.

JAMES GLAISHER, F.R.S., an honored foreign member, attained the grand age of ninety-four years. When but twenty years old he was made an assistant on the principal triangulation of the Ordnance Survey of Ireland. His chief work during his life was the investigation of subjects on practical Meteorology. His contributions in this field and in Astronomy are exceedingly numerous and valuable. His hygrometrical tables, first published in 1847, passed through

eight editions, and with his *Travels in the Air*, *Diurnal Range Tables*, *Report on the Meteorology of India* and *Meteorology of Palestine*, are among his chief writings. In the interests of meteorology he made twenty-nine balloon ascensions in four years. In the one of September 5, 1862, he and his companion attained the highest distance from the earth (37,000 feet) ever reached. He was a pioneer in the systematic organization of meteorological observations. In 1850 he was one of the founders of the Royal Meteorological Society, being its original Secretary, "who nursed it through its infancy and youth, and left it to other hands only when it was old enough and strong enough to walk alone." He passed away February 7, 1903.

PROF. WILLIAM HARKNESS was born in Scotland on December 17, 1839. He died at Jersey City, N. J., U. S. A., February 28, 1903.

From *Science* we learn that he graduated in 1858 as an A.B. from Syracuse University, from which institution he also received the degrees of A.M. (1861) and LL.D. (1874). In 1862 he received the degree of M.D. from a New York school, and in August of that year became aid to the U. S. Naval Observatory. In August, 1863, he was commissioned Professor of Mathematics in the Navy with the rank of lieutenant-commander. From October, 1865, to June, 1866, he served on the U. S. Monitor *Monadnock*, making observations on the behavior of her compasses under the influence of the heavy iron armor of the ship. This was the most elaborate discussion of the behavior of compasses on armed ships that has ever been made. His report was published by the Smithsonian Institution in a volume of 225 quarto pages. On his return to Washington he was attached to the Hydrographic Office for one year, and thereafter for seven years to the Naval Observatory, during which period he observed the total solar eclipse at Des Moines, Iowa, and discovered the famous coronal line *K* 1474, also the total solar eclipse of December 22, 1870, at Syracuse, Sicily, and in 1871 was appointed one of the original members of the U. S. Transit of Venus Commission to arrange for the observation of the transits of that planet in 1874 and in 1882. He devised most of the instruments for the purpose and fitted out the various expeditions in this country. His own station was at Hobart, Tasmania.

In 1875 he studied the observations of the U. S. parties from a series of wet collodion photographs on glass plates. He suc-

ceeded where others failed, and in the course of his study in 1877 invented the spherometer caliper. In 1879 he discovered the theory of the focal curve of achromatic telescopes. In 1876 he set up the Government astronomical exhibit at the Centennial Exposition in Philadelphia, Pa. In 1878 he observed the transit of Mercury at Austin, Texas, and the total solar eclipse at Creston, Wyoming, in July of that year, 1878. He carried on extensive experiments in astronomical photography, and in 1881 to 1883 was engaged in reducing the zones of stars observed by Capt. Gillin at Santiago, Chile, in 1849 to 1852. In 1888-9 and 1890 he gave much time to the preparation of his work on *The Solar Parallax and Its Related Constants*. From 1891-1899 he was chiefly occupied in following the erection of the new Naval Observatory, in devising and mounting its instruments, etc., etc. In 1894 he became astronomical director of the Naval Observatory, with complete control of all its astronomical work. He also became director of the *Nautical Almanac* in June, 1897. These offices he held until his retirement for age, December 17, 1899, with the rank of rear-admiral. He was the author of many scientific papers and member of numerous scientific societies, President of the Washington Philosophical Society in 1887, and President of the American Association for the Advancement of Science in 1893.

PROF. J. PETER LESLEV. There are those in this audience who can speak more fully of this departed friend than the speaker. These halls knew the great geologist well. The interests of this Society were his. Many hours did he bestow upon its affairs, and about us there are many evidences of his unselfish labors. My knowledge of him was very slight. I saw him frequently in the halls and the museum of the University of Pennsylvania, but beyond the formal bow it was not my privilege to know him. In the September issue of the *American Geologist* for 1903 our associate, Dr. Persifor Frazer, has recorded a picture of this successful teacher and investigator, from which we abstract the following facts. This city was Lesley's birthplace. The natal day was September 17, 1819. His training was received here and in the University, where he completed his studies in 1838. At Princeton he studied Theology from 1841 to 1843, and in 1844 obtained his ministerial license. The year of 1844-45 he spent in study at the University of Heidelberg. For five years (1846-1851) he officiated as pastor of the

Congregational Church in Milton, Mass. At the expiration of that period he left the ministry and devoted his whole time to geological pursuits. In 1872 he became Professor of Geology and Mining in the University of Pennsylvania, as well as the Dean of its Faculty of Science. In 1874 he was entrusted with the directorship of the second geological survey of this State.

"The hundred volumes and thousands of maps and sections of this survey will be his most enduring monument."

He threw great light upon the rock oil problem. He was one of the original members of the National Academy of Sciences; President of the American Association for the Advancement of Science in 1884, and author of *Man, His Origin and Destiny, from the Platform of the Sciences; Coal and Its Topography, etc.*

"Lesley's character was wholly noble. He was generous to prodigality towards others while careless of his own ease and comfort. Plain living and high thinking was the motto which moulded his life."

Surrounded in his closing years by a loving wife and devoted daughters, he peacefully passed away on June 1, 1903, at Milton, Mass.

SIR GEORGE GABRIEL STOKES was born August 13, 1819, at Skreen, County Sligo, of which parish his father was rector. He entered Pembroke College, Cambridge, in 1837, graduated in 1841, became Fellow of the College in the same year, and in 1849 was elected Lucasian Professor of Mathematics.

Professor Tate writes, "To us, who were mere undergraduates when he was elected to the Lucasian Professorship, but who had with mysterious awe speculated on the relative merits of the man of European fame whom we expected to find competing for so high an honor, the election of a young and (*to us*) an unknown candidate was a very startling phenomenon, but we were still more startled a few months afterwards when the new Professor gave public notice that he considered it part of the duties of his office to assist any member of the University in difficulties he might encounter in his mathematical subjects. Here was, we thought, a single knight fighting against the whole melee of the tournament, but we soon discovered our mistake, and felt that the undertaking was the effect of an earnest sense of duty on the conscience of a singularly modest but exceptionally able and learned man, and so it has

proved." Stokes may justly be looked upon as in a sense one of the intellectual parents of the school of Natural Philosophy which Cambridge has nurtured, the school which numbers in its ranks Sir William Thompson and Sir William Maxwell.

He was really a great discoverer in Mathematics and Physics. Stokes fully apprehended the physical basis of spectral analysis and pointed out how it could be applied to the detection of the constituents of the atmosphere of the sun and stars. In some of his earlier papers he has laid down the scientific distinction between rotational and differentially irrotational motion, which forms the basis of Helmholtz's magnificent investigations about vortex motion. His papers on the (long) spectrum of the electric light, and particularly those on the absorbent spectrum of the blood, are of very great value.

Sir William Thompson says that Stokes roamed over the whole domain of Natural Philosophy in his work and thought, Electricity being the single field which he looked upon from the outside. He even enriched pure Mathematics of a highly transcendental kind. Mathematics with Stokes was the servant and assistant, not the master. In science his guiding star was Natural Philosophy. In 1843 he published his *Theory of the Viscosity of Fluids* and a little later his *Theory of Oscillatory Waves*. "The Dynamical Theory of Diffraction" was one of his most important contributions on the subject of light. In his paper on "The Change of Refrangibility of Light" he described his now well-known discovery of Fluorescence, according to which a fluorescent substance emits in all directions from the course through it of a beam of homogeneous light.

Stokes' scientific work and scientific thought are but partially represented by his public writings. He gave generously and freely of his treasures to all who were fortunate enough to have the opportunity of receiving from him.

Sir William Thompson says "that his teaching me the principles of solar and stellar Astronomy while we were walking about among the Colleges, sometime prior to 1852, is but one example of his generosity."

The funeral of this great man took place last February at Cambridge, England. The most distinguished representatives of many branches of learning were present. The University church was crowded in every part. The assembly constituted a living witness

of the esteem in which the memory of Sir George Stokes is held in the intellectual world. The coffin containing the late Master's body was first carried around the court of Pembroke College, in accordance with an ancient custom reserved for Masters, the procession being formed of the choir and officiating clergy, the Fellows of the College, former Fellows, Masters of Arts, Bachelors of Arts and undergraduates. The interment took place at Mill Road Cemetery.

In the words of Lord Kelvin, "The world is poorer through his death, and we who knew him feel the sorrow of bereavement."

PROF. JOSIAH WILLARD GIBBS. From the *American Journal of Science* for September, 1903, we glean that he was born February 11, 1839, in New Haven, where his father was professor of Sacred Literature in the Yale Divinity School. He entered Yale College in 1854 and graduated in 1858. During his academic course he received several prizes in Latin and Mathematics. In 1863 he won the Ph.D. degree and was appointed to a tutorship in the College. The winter of 1866-67 he spent in Paris, and the year following went to Berlin, where he heard Magnus and others in physics and mathematics. In 1868 he listened to Kirchhoff and Helmholtz at Heidelberg. In 1871 he became Professor of Mathematical Physics at Yale; this position he held until the time of his death. It was not until he was thirty-four years old that he gave to the world, by publication, evidence of his extraordinary powers as an investigator in Mathematical Physics. In 1876 and 1878 appeared two parts of his great paper "On the Equilibrium of Heterogeneous Substances." The third overshadowed these somewhat. This is his most important contribution to physical science. It is one of the greatest and most enduring monuments of the wonderful scientific activity of the nineteenth century.

The publication of this work was universally regarded an event of the first importance in the history of Chemistry. It founded a new department of chemical science. Yet years elapsed before its value was generally recognized. It was translated into German in 1891 by Ostwald, and into French in 1899 by LeChatelier.

In 1881 and 1884 he printed for private use a concise account of vector analysis. This he applied to some of the problems of astronomy. In 1888 to 1889 he contributed five papers on points in the electro-magnetic theory of light and its relations to the various elas-

tic theories. His last work was upon *Elementary Principles in Statistical Mechanics*.

The value of Williard Gibbs' work to science has been formally recognized by many learned societies and universities at home and abroad. He was a member of the National Academy of Sciences, the Royal Institute of Great Britain, the Royal Society of London, etc., etc., and the recipient of honorary degrees from Williams College and from the Universities of Erlangen, Princeton and Christiana. In 1881 he received the Rumford medal from the American Academy of Boston, and in 1901 the Copley medal of the Royal Society of London.

His life was uneventful. He made but one visit to Europe. He lived in New Haven, in the same home which his father built, a few rods from the school where he prepared for College and from the University, in the service of which his life was spent. He never married. He was retiring in disposition, went little into society and was known to few outside the University. His modesty in regard to his work was proverbial. "Unassuming in manner, genial and kindly in his intercourse with his fellow-men, devoid of personal ambition of the baser sort, or of the slightest desire to exalt himself, he went far toward realizing the ideal of the unselfish Christian gentleman." He died April 28, 1903.

They are gone. The world and we shall miss them. May the good they have accomplished serve as further incentives to us to press forward—each in his own specialty—without ceasing, in quest of the all-satisfying, all-enlightening truth.